(Translation)

J A P A N P A T E N T O F F I C E

This is to certify that the annexed is a true copy of the following application as filed with this Office.

Date of Application : November 2, 2000

Application Number : 336217/2000

Applicant(s) : Toyo Boseki Kabushiki Kaisha

October 19, 2001

Commissioner, Japan Patent Office
Kozo OIKAWA
Certificate No. 2001-3091257

【Document】 Petition for Patent

【Reference Number】 CN00-0705

【Submission Date】 November 2, 2000

【To】 Commissioner of the Patent Office

【International Classification】 G03F 7/00

【Inventor】

【Address】 c/o Toyo Boseki Kabushiki Kaisha Research Center, 1-1, Katata 2-chome, Ohtsu-shi, Shiga, Japan

【Name】 Yuji Taguchi

【Inventor】

【Address】 c/o Toyo Boseki Kabushiki Kaisha Research Center, 1-1, Katata 2-chome, Ohtsu-shi, Shiga, Japan

【Name】 Koji Syoki

【Inventor】

【Address】 c/o Toyo Boseki Kabushiki Kaisha Research Center, 1-1, Katata 2-chome, Ohtsu-shi, Shiga, Japan

【Name】 Hajime Kouda

【Applicant】

【Identification Number】 000003160

【Name】 Toyo Boseki Kabushiki Kaisha

【Representative】 Junji Tsumura

【Official Fee】

【Deposit Ledger Number】 000619

【Payment Amount】 21000

【List of the Annexed Documents】

【Document】 Specification One copy

【Document】 Abstract One copy

【Proof】 Requested

【Document】 SPECIFICATION

【Title of the Invention】 PHOTOSENSITIVE RESIN SIGNBOARD

【What is Claimed is】

【Claim 1】 A photosensitive resin signboard comprising at least a support and a relief obtained from a photosensitive resin laminate having a photosensitive resin layer, which further comprises a layer having an image laminated on the side of the support.

【Claim 2】 The photosensitive resin signboard of claim 1, wherein the layer having the image is directly printed on the back of the support.

【Claim 3】 The photosensitive resin signboard of claim 1, wherein the photosensitive resin layer has an ultraviolet absorbance at 400 nm of not more than 0.4.

【Claim 4】 The photosensitive resin signboard of claim 1, wherein the support shows a total light transmission of not less than 60%.

【Detailed Description of the Invention】

【Technical Field to which the Invention Pertains】

The present invention relates to a signboard made of photosensitive resin, which is used for signboards such as display panel, decoration shield, name plate, Braille board and the like. Particularly, the present invention provides a photosensitive resin signboard superior in design.

【Prior Art】

Photosensitive resin laminates using a photosensitive resin layer exposed to light through a pattern and thereafter developed to produce a photosensitive resin have been conventionally disclosed in JP-A-58-55927, JP-A-9-6267 and the like and used for Braille panels having a relief, signboards containing Braille and the like.

However, the need for good designs of signboards is increasing in recent years, to the point that a conventional simple signboard having a typical concavo-convex pattern

colored with a color paint is not satisfactory.

【Problems to be Solved by the Invention】

It is therefore an object of the present invention to provide a signboard using a photosensitive resin composition usable for display panel, decoration shield, name plate, Braille board and the like, which signboard have a superior design.

【Means of Solving the Problems】

The present inventors have conducted intensive studies in an attempt to solve the above-mentioned problems and completed the present invention. That is, the present invention provides

(1) A photosensitive resin signboard comprising at least a support and a relief obtained from a photosensitive resin laminate having a photosensitive resin layer, which further comprises a layer having an image laminated on the side of the support.

(2) The photosensitive resin signboard of the above-mentioned (1), wherein the layer having the image is directly printed on the back of the support.

(3) The photosensitive resin signboard of the above-mentioned (1), wherein the photosensitive resin layer has an ultraviolet absorbance at 400 nm of not more than 0.4.

(4) The photosensitive resin signboard of the above-mentioned (1), wherein the support shows a total light transmission of not less than 60%.

【Embodiment of the Invention】

The present invention is now explained in more detail.

The images to be used in the present invention includes anything generally expressed two-dimensionally, showing human, figure, pattern and the like. For example, human, scenery, design, pattern and the like may be shown. In the context of the present invention, letters may be also used.

Examples of the layer having a concrete image include photographs, paintings, printed matters and the like. The

layer having an image may contain paper, film or plate as a support, or may be without a support.

As a method of laminating a layer having an image to be used in the present invention, a method comprising directly printing on the back, a method comprising adhering photograph, printed matter and the like having images formed on a support of paper, film and the like, and the like can be mentioned.

As a method of directly printing on the back of the support to be used in the present invention, screen printing, ink let printing, thermal transfer printing and the like can be used. In view of the applicability to a plate support, screen printing is superior.

As a method of laminating a layer having a photograph, printed matter and the like having images to be used in the present invention, a method comprising applying an adhesive onto the back of a support and adhering the photograph, the printed matter and the like can be used for production. When a signboard has a frame etc. that can fix the entire signboard, a photograph, printed matter and the like having images may be registered on the back of the support and fixed with the frame and the like for laminating a layer having an image.

The photosensitive resin layer to be used in the present invention is a colorless or mildly colored photosensitive resin layer and needs to show an ultraviolet absorbance at 400 nm of not more than 0.4.

As a photosensitive resin layer to be used in the present invention, a known one can be used, and for controlling the absorbance at 400 nm to 0.4 or below, those satisfying the absorbance of respective starting materials may be selected. As specific examples of the photosensitive resin components, a soluble polymer compound (e.g., poly(vinyl alcohol), cationic polyamide, polyether ester amide, polyether amide, polyurethane and the like), photopolymerizable or photocrosslinkable monomer (e.g., acrylate of polyhydric

alcohol, epoxy acrylate of polyhydric alcohol, N-methylolacrylamide and the like), photopolymerization initiator (e.g., benzyldimethyl ketal, benzoindimethyl ether and the like), and a photosensitive resin composition containing, where necessary, a heat stabilizer, a plasticizer, a surfactant, an ultraviolet absorber and the like can be mentioned.

Examples of the commercially available transparent resin for support to be used in the present invention include polyester resins such as polycarbonate resin, polyethylene terephthalate resin and the like, acrylic resins such as polymethylmethacrylate and the like, copolymer resin of polymethylmethacrylate and styrene, modified polyethylene terephthalate resin obtained by copolymerization of dicyclohexanedimethanol and the like, and the like. For light resistance, acrylic resin and copolymer resin of polymethylmethacrylate and styrene are preferable. For an improved light resistance, a coating layer containing an ultraviolet absorber may be formed on the support, an acrylic resin superior in light resistance may be laminated on the surface. For improved light resistance, modified polyethylene terephthalate resin having an acrylic resin layer or a layer containing an ultraviolet absorber, and a modified polyethylene terephthalate resin containing an ultraviolet absorber are preferable. For improved quality such as transparency, these resins may be modified by copolymerization or blending or modified by adding an additive such as a plasticizer and the like.

As the thickness of the support used in the present invention, a thickness generally in the range of 1 mm - 10 mm is employed depending on the use and design. When the support has a thickness of less than 1 mm, the support itself may warp easily, which is not suitable for signboard use, whereas a thickness exceeding 10 mm is unpreferable because the plate

does not cut easily and weighs too much.

The support usable in the present invention needs to have a Shore D hardness of not less than 35°, more preferably not less than 55°, particularly desirably 75°. When Shore D hardness is less than 35°, the support itself may warp easily, thus unpreferably lacking the retention performance as a signboard.

To use the photosensitive layer used in the present invention for Braille, for example, the photosensitive layer needs to have a thickness of not less than 500 μ, preferably 800 - 1200 μ. When the thickness exceeds 1200 μ, image reproductivity of the support decreases, which is not preferable.

The support to be used in the present invention is preferably transparent in view of design, and has a total light transmission of not less than 60%, preferably not less than 65% and particularly preferably not less than 70%. When the total light transmission is less than 60%, the support fails to provide a good taste after processing into a signboard and is unsuitable for a signboard having a superior design.

The photosensitive resin laminate of the present invention can be produced by applying the adhesive to be mentioned later on the aforementioned support and laminating a photosensitive resin layer by a known method. As a method of laminating photosensitive resin on a support, an optional method such as heat press, injection molding, melt extrusion, solution casting, lamination and the like can be used to laminate the signboard on the support mentioned above.

The aforementioned photosensitive resin layer may be laminated in advance on, for example, a resin film of polyethylene terephthalate and the like as a support (hereinafter to be referred to as a photosensitive resin laminate precursor) and, when preparing a signboard therefrom,

it is laminated on the resin support upon peeling off of the resin film.

The aforementioned photosensitive resin laminate precursor can be prepared by a method generally employed for forming a photosensitive resin laminate for a printing plate. For example, a photosensitive resin layer precursor comprising a photosensitive resin layer, a slip coat layer and a cover film disposed between the aforementioned resin film (preferably without adhesiveness in this case), and a 125 μm-thick polyester cover film having a layer of non-adhesive transparent polymer that can be dispersed or dissolved in a developing solution [(poly(vinyl alcohol), celluloses and the like, which is also called a slip coat layer)] in a thickness of 1 - 3 μm, can be obtained.

In the present invention, the adhesive layer used for adhering a photosensitive resin layer (optionally having a slip coat layer and a cover film) to the aforementioned resin support may be a known adhesive. Examples thereof include polyester urethane adhesives wherein a soluble polyester is cured with polyhydric isocyanate, epoxy adhesives and the like. Of these, polyester urethane adhesive is preferable because it is superior in the adhesion to a photosensitive resin. Of the polyester urethane adhesives, particularly an adhesive comprising polyester and isocyanurate type polyhydric isocyanate is desirable because it dries at a low temperature.

The adhesive layer composition may contain small amounts of other components. Examples of the additive include plasticizer, dye, ultraviolet absorber, halation preventive, surfactant, photopolymerizable vinyl monomer and the like.

An adhesive layer is formed on a support typically by applying a solution of the composition for adhesive layer in a predetermined thickness and removing the solvent. The application method may be known, such as roll coater, curtain flow coater, slit die coater, gravure coater, spray and the

like. The adhesive layer after coating on a support is generally dried by blowing hot air in a drying furnace.

The drying temperature of the adhesive layer to be used in the present invention is preferably 15°C to less than 80°C, and desirably 20°C - 70°C. When it exceeds 80°C, the support unpreferably gets warped and deformed. The temperature lower than 15°C prolongs the drying time, which is also unpreferable.

The adhesive layer needs to have a thickness of 0.5 μ - 100 μ. When the thickness is not more than 0.5 μ, the adhesive power cannot be achieved between the photosensitive resin layer and the adhesive layer, whereas when it exceeds 50 μ, the time necessary for drying the coated solution becomes problematically longer. In view of the above, the adhesive layer needs to have a thickness of 0.5 μ - 100 μ, preferably 1 μ - 50 μ.

A signboard of the present invention can be prepared from the photosensitive resin laminate comprising a supporting plate, an adhesive layer and a photosensitive resin layer, which may further have a slip coat layer and a cover film, according to a method generally used for producing printing plates. For example, a negative film having a transparent image part is closely adhered onto a photosensitive resin layer via a slip coat layer or otherwise, and an actinic ray is shot thereon to insolubilize and photocure only the exposed part. The actinic radiation is obtained from a light source generally having a wavelength of 300 - 450 nm, such as high pressure mercury lamp, ultrahigh pressure mercury lamp, metal halide lamp, xenon lamp and the like.

Then, an unexposed part is removed by dissolution in a suitable solvent, particularly neutral water in the present invention, whereby a relief plate having a clear image part is obtained. For this end, spray developing apparatus, brush developing apparatus and the like can be used.

Following the above methods, a signboard of the present

invention having a relief can be produced. Various signboards can be obtained, which expands the range of use, by coloring the relief with a paint, adding a pigment to a support and the like.

[Examples]

The present invention is explained in detail by referring to examples. The present invention is not limited by these examples in any way. The ultraviolet transmission and light resistant test are expressed by the values measured according to the following methods.

Ultraviolet absorbance: Photosensitive resin compositions were cut out in 30 mm × 70 mm (thickness 800 μm), and the ultraviolet absorbance at 400 nm was measured with a self-recording spectrophotometer (U-3210, Hitachi, Ltd.).

Total light transmission: Measured using a turbidimeter (haze meter, NDH-1001DP Nippon Denshoku Industries Co., Ltd.).

Example 1

As a support, used was a 2.0 mm-thick acrylic plate (polymethylmethacrylate resin) having a total light transmission of 92%.

As an adhesive layer, used was a polyester urethane adhesive, and a solution of the composition for adhesive layer was prepared as follows. A polyester resin (VYLON RV-200, 80 parts by weight, Toyo Boseki Kabushiki Kaisha) was heated and dissolved in a mixed solvent (1940 parts by weight) of toluene/methyl ethyl ketone=80/20 (weight ratio) at 80°C. After cooling, DESMODUER HL (20 parts by weight, Sumitomo Bayer Urethane), an isocyanurate type polyhydric isocyanate obtained from hexamethylene diisocyanate and toluene diisocyanate was used as an isocyanurate type polyhydric isocyanate, and triethylenediamine (0.06 part by weight) was added as a curing catalyst, after which the mixture was stirred for 10 min.

The thus-obtained solution of the composition for

adhesive layer was applied on acrylic plate having a thickness of 2.0 mm, such that a film thickness was 12 μm, cure-dried at 50°C for 20 min to give a support having an adhesive layer.

As the photosensitive resin composition to be laminated, poly(vinyl acetate) having a degree of hydrolysis of 36% (55 parts, SMR-30L, Shin-Etsu Chemical Co., Ltd.) was stirred in methanol (100 parts) at 60°C for 2 h to completely dissolve the polymer. To the obtained solution were added a solution of sodium laurylbenzenesulfonate (3 parts) dissolved in water (10 parts), and hydroquinone monomethyl ether (0.1 part), acrylic acid adduct of bisphenol A diglycidyl ether (40.9 parts) and benzyl dimethyl ketal (1 part) were added and the mixture was stirred for 30 min to give a solution of the photosensitive resin composition. This solution was cast on a polyester film having a polyvinyl alcohol having a hydrolysis degree of 98%, which was coated in a thickness of 2 μ. Methanol was evaporated to give a photosensitive resin layer precursor having a thickness of about 800 μm.

The photosensitive resin layer precursor obtained above was adhered to a support having an adhesive layer in the following method. The surface of a photosensitive resin composition and the surface of a support were registered and water was poured between these surfaces. The photosensitive resin layer was press-adhered at room temperature at 25°C by passing the laminate through a rubber roller whose gap clearance had been adjusted according to the thickness of the laminate, to give a photosensitive resin laminate. The obtained photosensitive resin laminate was stood for one day and cut into a predetermined size with a circular saw teeth cutter. A negative was placed thereon and subjected to exposure, development, drying and post-exposure treatment to give a signboard whose photosensitive resin layer has a UV absorbance of 0.28.

The relief part of the obtained photosensitive resin

signboard was colored with a blue spray paint (blue acrylic spray, ASAHI-PEN CO., LTD.), and on the back of the support without a photosensitive resin layer was registered with a color photograph showing a sand beach, and fixed with an aluminum frame.

The obtained signboard which had a layer having an image laminated on a support side had superior design of sand beach as the scenic backdrop with a display relief colored in blue.

Comparative Example 1

As a support, used was a phenol board having a thickness of 2.0 mm and a total light transmission of 0%.

In the same manner as in Example 1 except the support, a photosensitive resin laminate was produced using the same adhesive layer as in Example 1. The obtained photosensitive resin laminate was stood for one day and cut into a predetermined size with a circular saw teeth cutter. A negative was placed thereon and subjected to exposure, development, drying and post-exposure treatment to form a pattern of the signboard. The entire surface of the obtained signboard was colored with a spray paint of Example 1 and the relief part was colored with a gold acrylic spray paint (ASAHI-PEN CO., LTD.). However, it was poor in design because the scenic backdrop was not a photograph.

Example 2

The image photograph used in Example 1 was changed to a sheet with a stone pattern to give a signboard having a layer having an image laminated on the support side.

The obtained photosensitive resin signboard was superior in design with the stone pattern as the background and a display relief colored with a blue acrylic spray.

Example 3

The photograph showing a sand beach as used in Example 1 was adhered to the back of the support without a photosensitive resin layer with an adhesive. A wood adhesive

(CEMEDINE CO., LTD.) was applied and immediately adhered to the photograph to give a signboard having an image layer laminated on the support.

The obtained photosensitive resin signboard was superior in design with the stone pattern as the background and a display relief colored in blue.

Example 4

In the same operation manner as in Example 1, a signboard having a relief layer was obtained from the photosensitive resin layer.

Using a screen printing machine (MT-320, MURAKAMI CO., LTD.), a layer having a pattern of 1 cm wide alternate print of indigo blue and dark indigo of PRT ink for screen print obtained from MURAKAMI CO., LTD. printed with a polyester 200 mesh silk gauze was laminated on the back of the support of the obtained signboard.

The obtained photosensitive resin signboard was superior in design with a pattern of the alternate dark blue and blue prints as the background.

【Effect of the Invention】

The photosensitive resin signboard of the present invention having the above-mentioned constitution has a layer having an image, which is laminated on the support side, and enables provision of a photosensitive resin signboard having a superior design, thus greatly contributing to the industry.

【Document】 Abstract

【Summary】 Provision of a photosensitive resin signboard superior in design, which is used for display panel, decoration shield, name plate, Braille board and the like.

【Problems】 (1) A photosensitive resin signboard comprising at least a support and a relief obtained from a photosensitive resin laminate having a photosensitive resin layer, which further comprises a layer having an image laminated on the side of the support. (2) The photosensitive resin signboard of the above-mentioned (1), wherein the layer having the image is directly printed on the back of the support. (3) The photosensitive resin signboard of the above-mentioned (1), wherein the photosensitive resin layer has an ultraviolet absorbance at 400 nm of not more than 0.4. (4) The photosensitive resin signboard of the above-mentioned (1), wherein the support shows a total light transmission of not less than 60%.

【Main Drawing】 None